

# SEAT CONSTRUCTION AND A METHOD FOR PRODUCING A SEAT CONSTRUCTION

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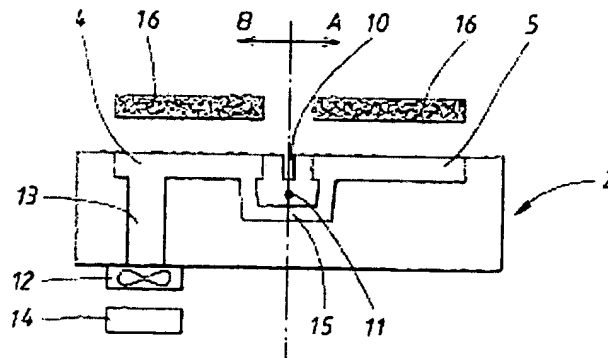
## Cited documents:

US6179706  
 WO0211968  
 US6206465  
 DE10037065  
 DE19805174  
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## Abstract of WO03101777

The invention relates to a seat construction (1) comprising a seating part (2) and a backrest part (3) and contrived for ventilation by injection of air to or extraction of air from at least two air-distributing recesses (4, 5) in the said seating part (2) or backrest part (3) arranged for the distribution of supplied or evacuated air to or from the surface of the said seating part (2) or backrest part (3). The invention is characterized in that at least one connecting duct (15), connecting the said air-distributing recesses (4, 5), passes at least one trench (10) present in the seat (1) for upholstery-fastening application in such a way that the said connecting duct (15) is led beneath the said trench (10) or through the said trench (10). The invention also relates to a method for producing such a seat construction. By virtue of the invention, an improved seat construction is obtained, especially of the type which is contrived for ventilation.



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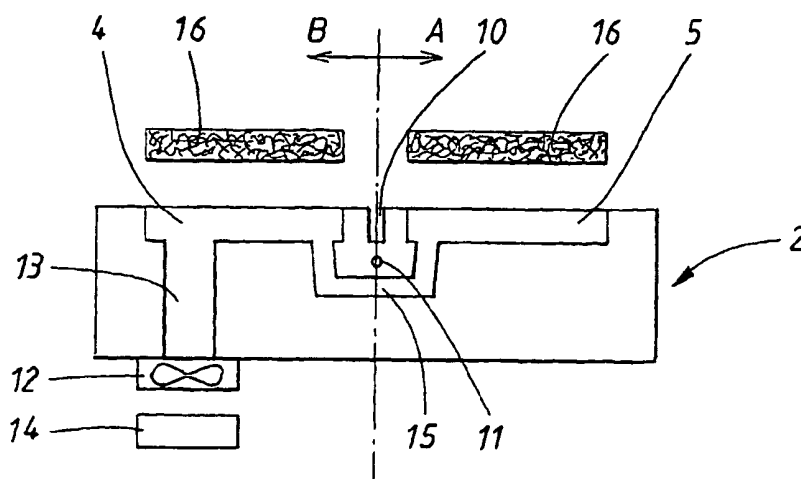
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(54) Title: **SEAT CONSTRUCTION AND A METHOD FOR PRODUCING A SEAT CONSTRUCTION**



(57) Abstract: The invention relates to a seat construction (1) comprising a seating part (2) and a backrest part (3) and contrived for ventilation by injection of air to or extraction of air from at least two air-distributing recesses (4, 5) in the said seating part (2) or backrest part (3) arranged for the distribution of supplied or evacuated air to or from the surface of the said seating part (2) or backrest part (3). The invention is characterized in that at least one connecting duct (15), connecting the said air-distributing recesses (4, 5), passes at least one trench (10) present in the seat (1) for upholstery-fastening application in such a way that the said connecting duct (15) is led beneath the said trench (10) or through the said trench (10). The invention also relates to a method for producing such a seat construction. By virtue of the invention, an improved seat construction is obtained, especially of the type which is contrived for ventilation.

WO 03/101777 A1

## Seat construction and a method for producing a seat construction

### TECHNICAL FIELD

5 The present invention relates to a seat construction comprising a seating part and a backrest part and contrived for ventilation by injection of air to or extraction of air from at least two air-distributing recesses in the said seating part or backrest part arranged for the distribution of supplied or evacuated air to or from the surface of the said seating part or backrest part.

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More especially, the invention finds application in connection with the ventilation of seats intended for passengers in a vehicle.

The invention also relates to a method for producing a seat construction  
15 comprising a seating part and a backrest part and contrived for ventilation by injection of air to or extraction of air from at least two air-distributing recesses in the said seating part or backrest part arranged for the distribution of supplied or evacuated air to or from the surface of the said seating part or backrest part.

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### BACKGROUND ART

For comfort and safety reasons, ventilation and temperature regulation of seats are used, for example, in vehicles. Both the driver's seat and other vehicle seats can in this case be contrived for ventilation by injection or  
25 extraction of air by means of a fan. When air is injected, this supplied air is conducted through the seat and out towards the person sitting in the seat in question. When air is extracted, this extracted air is conducted from the person sitting in the seat in question in through the seat. Temperature regulation of the seat can be realized by way of cooling of the supplied air,  
30 alternatively by heating of the seat by means of a special, electrically heatable heating element. The heating element can then be constituted, for example, by electrically conductive wires which are placed in the form of a heating coil in the respective seat. As a result of the heating element being

connected to a power supply unit which supplies current, the heating element can be heated to a suitable temperature.

Both the driver's seat and other vehicle seats can also be contrived so that  
5 they can be cooled with supplied injected air, which, in turn, is cooled by means of a special cooling device, for example in the form of a so-called Peltier element. In certain cases, however, it can be more agreeable to have ventilation by air sucked from whomever is sitting in the seat, which air is conducted onward down through the seat. In this case, no special cooling  
10 device is used.

The said seat is normally produced by so-called cold-foaming, which is a previously known production method for producing soft, elastic foam plastic. The material for the pre-moulded part which is used as the seating part and  
15 backrest part is called comfort foam. Connected to this part, a heating coil can, where appropriate, be fitted. A suitable upholstery is then fixed to the seat. Preferably, the forming tool which is used in the cold-foaming process is configured such that so-called trenches, which can be one or more in number, are formed in the comfort foam in the course of its moulding. These  
20 trenches are relatively narrow depressions in the comfort foam, so-called staves, i.e. thin, formed metal rods on the underside of the upholstery, being used to secure interacting fastening members disposed in the bottom of the respective trench. The upholstery is thus guided down into the trenches and fixed there by means of the staves, whereby the upholstery will be clamped  
25 against the seating part.

The seating part of the seat can be divided into a front and a rear panel, in which the front panel constitutes the front half of the seating part, whilst the rear panel constitutes the rear half of the seating part. The injected or  
30 extracted air is distributed via at least two recesses which are made in the comfort foam, one in the front panel and one in the rear panel. These recesses have a certain depth and have a certain shape, for example circular, rectangular or polygonal. The recesses are connected to a fan which

can inject or extract air via ducts realized in the comfort foam. In the case of air-injection, the said cooling element can be placed before or after the said fan. The recesses can then be filled with an air-distributing material, which, for example, can have a porous, fibrous structure. A similar construction can also apply to the backrest part of the seat. Like the trenches, the recesses are preferably configured in the foam plastic of the seat, as a result of the forming tool which is used in the cold-foaming process being configured such that the said recesses are formed in the comfort foam in the course of its moulding.

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The said trenches, recesses and air ducts will, however, be combined together in such a way in the comfort foam that they constitute a working system for the seat, air being supplied, alternatively evacuated, respectively to and from the panels in an unobstructed manner.

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WO 01/05623 shows a duct system in a vehicle seat made of foam plastic. The air is introduced through a damper-regulated duct in the foam plastic, is conducted through a porous "mattress" running along the seating surface and is guided out through another duct in which a suction fan is mounted.

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By virtue of patent document US 5924766, an arrangement in which air is fed to a vehicle seat, more precisely to its seating part and backrest part, is previously known. The supplied air can be cooled by means of a Peltier element.

25

SE 514578 shows a ventilation system for vehicle seats, which system comprises a network of ducts for the passage of air, in which at least one part-quantity of the ducts can be shut off.

30

The said document fails to show, however, how trenches, recesses and air ducts in the comfort foam are to be combined to constitute a working system for the seat in which air is supplied, alternatively evacuated, respectively to and from the panels in an unobstructed manner.

## DISCLOSURE OF INVENTION

A principal object of the present invention is to provide a working combination of the said trenches, recesses and air ducts, which are all made of comfort foam.

This object is achieved by means of a seat construction according to subsequent claim 1, which comprises a seating part and a backrest part and is contrived for ventilation by injection of air to or extraction of air from at least two air-distributing recesses in the said seating part or backrest part arranged for the distribution of supplied or evacuated air to or from the surface of the said seating part or backrest part. The invention is characterized in that at least one connecting duct, connecting the said air-distributing recesses, passes at least one trench present in the seat for upholstery-fastening application in such a way that the said connecting duct is led beneath the said trench or through the said trench.

The said object is also achieved by means of a method for producing a seat construction according to subsequent claim 8, i.e. a seat construction comprising a seating part and a backrest part and contrived for ventilation by injection of air to or extraction of air from at least two air-distributing recesses in the said seating part or backrest part arranged for the distribution of supplied or evacuated air to or from the surface of the said seating part or backrest part. The method according to the invention is characterized in that it comprises the introduction of at least one connecting duct for connecting the air-distributing recesses in such a way that the said at least one connecting duct passes at least one trench present in the seat for upholstery-fastening application in such a way that the said connecting duct is led beneath the said trench or through the said trench.

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## BRIEF DESCRIPTION OF DRAWINGS

The invention will be described below in connection with preferred illustrative embodiments and the appended drawings, in which:

- Figure 1 is a projection viewed from behind and below of a vehicle seat according to the invention;
- Figure 2 is a projection directly from behind and from below of a vehicle seat according to the invention;
- 5 Figure 3 is a partially cut-through projection of the seating part of a vehicle seat;
- Figure 4 is a sectional view of the seating part of a vehicle seat;
- Figure 5 is a sectional view of the seating part of a vehicle seat;
- Figure 6 is a detailed projection of a trench with passing connecting duct  
10 according to the invention; and
- Figure 7 is a diagrammatic representation of a vehicle seat, showing control and sensor members for a vehicle seat.

#### PREFERRED EMBODIMENTS

- 15 The invention relates preferably to vehicle seats which, according to Figure 1 and Figure 2, are constituted by a seat 1 comprising a seating part 2 and a backrest part 3. The following description is directed at the seating part 2, but the configuration according to the following description can also be applied, in whole or in part, to a backrest part 3 belonging to the seating part 2.

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- The seating part 2 of a vehicle seat 1 can be divided into a front and a rear panel, A and B respectively, in which the front panel A constitutes the front half of the seating part 2, whilst the rear panel B constitutes the rear half of the seating part 2. The invention is not limited to use in seats with this  
25 division into panels, but can also be used in seats in which there is a different number of panels with different positioning along the seat.

- For increased comfort, the seating part 2 can be equipped for ventilation and temperature regulation. Both the driver's seat and other vehicle seats can in  
30 this case be contrived for ventilation by injection or extraction of air. The injected or extracted air is distributed via at least two recesses 4, 5 which are

realized in the seating part, one in the front panel A and one in the rear panel B. In Figure 1 and Figure 2, and also in Figure 3, there is shown in the front panel A, apart from the recess 5, also a second recess 5' with extent substantially parallel with the former recess 5. Such a second recess 5' is a possible but non-essential design solution, in which a total of three recesses 4, 5, 5' in the seating are used and should not be regarded as a limitation for the invention. As stated above, the invention can be used in seats which are configured with at least two recesses 4, 5. The continued description is directed only at the two recesses 4, 5, but the said description naturally also applies to other embodiments in which the aforementioned second recess 5' or still more recesses are present.

When air is injected against the surface of the seating, this supplied air is conducted through the seating part 2 and out towards the person sitting in the seat in question via the distributing recesses 4, 5. When air is extracted, this extracted air is conducted from the region adjacent to the person sitting in the seat in question in through the seating part 2 via the distributing recesses 4, 5.

According to an alternative embodiment of the invention, the seating part 2 can be temperature-regulated, which can in this case be realized by way of cooling of the supplied air, alternatively by heating of the seating part by means of a special, electrically heatable heating element 6, see Figure 3. The heating element 6 can then be constituted, for example, by electrically conductive wires, which are placed in the form of a heating coil 6 in the seating part 2. As a result of the heating element 6 being connected to a power supply unit 7 which supplies current, the heating element 6 can be heated to a suitable temperature.

With continued reference to Figure 3, the said seating part 2 is normally produced by so-called cold-foaming, which is a previously known production method for producing soft, elastic foam plastic. Cold-foaming is usually found in the production of stuffing material for cushions, mattresses, etc. and is



based on the fact that certain predetermined components are mixed and react together to produce foaming. The reaction takes place at relatively low temperature, expediently in a specially configured forming tool. In the cold-foaming process a "fermentation" occurs, whereby the finished plastics material is formed in the mould. The pre-moulded part is called comfort foam 8. Once this foam has been solidified in the intended realization, a heating coil 6 of the aforementioned type is firstly applied to the comfort foam 8, should the seating part 2 be heated by means of a heating element of the aforementioned type. The said heating coil 6 can in this event also be moulded into the comfort foam 8 a little way from its surface. After this, the desired upholstery 9 is applied to the seating part. The said upholstery 9 is clamped to the seating part 2, more precisely in one or more so-called trenches 10 configured in the foam plastic of the seating part 2. Preferably, the forming tool used in the cold-foaming process is configured such that the said one or more trenches 10 are formed in the comfort foam 8 in the course of its moulding. These trenches 10 are relatively narrow, duct-like depressions in the comfort foam 8, in the bottom of which so-called staves (not shown), i.e. thin, formed metal rods disposed on the underside of the upholstery 9, are used for securement with interacting fastening members 11 in the respective trench. These fastening members 11 are expediently constituted by elongated metal bars which are cast in the foam in connection with the trenches 10. The upholstery 9 is thus guided down into the trenches 10 and fixed there by means of the staves, which are then clamped against the fastening members 11 in the seating part 2.

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With reference to Figure 4 and Figure 5, which show a section of the seating part according to Figure 3, the recesses 4, 5 have a certain depth and a certain shape, for example circular, rectangular or polygonal. The recesses 4, 5 are connected to a fan 12, which can inject or extract air via at least one duct 13 configured in the comfort foam. The fan 12 is also shown in Figure 1 and Figure 2. When air is injected, a cooling element 14 can be placed before or after the said fan 12. In the figures, a cooling element 14 is shown placed before the fan 12. The fan 12 is preferably of the radial fan type. The

30

recesses 4, 5, in turn, are connected to at least one connecting duct 15. The recesses 4, 5 can further be filled with an air-distributing material 16, which, for example, can have a porous, fibrous structure for even distribution of the air flowing through the respective recess 4, 5. Like the trenches 10, the  
5 recesses 4, 5 are preferably configured in the foam plastic of the seating part 2 as a result of the forming tool which is used in the cold-foaming process being configured such that the said recesses 4, 5 and trenches 10 are formed in the comfort foam in the course of its moulding. Beneath the illustrated trench 10 (see Figure 4 and 5) are also shown the said interacting  
10 fastening members 11.

The connecting duct 15 connecting the said air-distributing recesses 4, 5 is combined with one or more trenches 10 present in the seating part 2 for upholstery-fastening application in such a way that the said connecting duct  
15 15 is led past the respective trench.

In Figure 4 is shown a first embodiment in which a first duct, a connecting duct 15, conducts air between the first recess 4 placed in the rear panel B and the second recess 5 placed in the front panel A, which first recess 4 is  
20 further connected to the fan 12 by a second duct 13. The said connecting duct 15 is led below a trench 10 with associated fastening element 11 (for interaction with a stave in the associated upholstery) before it reaches the second recess 5. In this way, the connecting duct 15 has been configured in such a way that air is transferred between the rear panel B and the front  
25 panel A, with associated respective first recess 4 and second recess 5, in an unobstructed manner.

Which of the recesses 4, 5 is placed in which panel A, B is reversible, depending on whether the fan 12 is placed in connection with the front panel  
30 A or the rear panel B.

In Figure 5 is shown a second embodiment, in which a first duct, a connecting duct 15, conducts air between the first recess 4 placed in the rear

panel B and the second recess 5 placed in the front panel A, which first recess 4 is further connected to the fan 12 by a second duct 13. The said connecting duct 15 is led through a trench 10 with associated fastening element 11 (for interaction with a stave in the associated upholstery) before it reaches the second recess 5. The connecting duct 15 hereupon in this case assumes a more tubular form when it conducts the air through the trench 10. The connecting duct 15 has thereby been configured in such a way that air is transferred between the rear panel B and the front panel A, with associated respective first recess 4 and second recess 5, in an unobstructed manner. Exactly as before, it is here too the case that which of the recesses 4, 5 is placed in which panel A, B is reversible, depending on whether the fan 12 is placed in connection with the front panel A or the rear panel B.

Figure 6 illustrates in greater detail how the connecting duct 15 (according to the embodiment shown in Figure 5) is led through a trench 10 in the bottom of which is disposed a fastening element 11 which, as can be seen from the figure, assumes a bar-like shape which at regular intervals is exposed, i.e. in connection with the surface at the bottom of the trench 10 in question. The fastening element 11 can be constituted by a straight bar, alternatively a zigzag-shaped bar, or can be configured in some other suitable manner. Alternatively, a number of shorter bars can be arranged in the surface of the foam to constitute a fastening element.

For the aforementioned embodiments, it is the case that the number of trenches 10 can be one or more and that the number of recesses can be more than the said at least two. For example, a recess 5' in the front panel A, which recess, according to Figure 1 and 2, is parallel, can be arranged according to the invention in the same manner as described above. In Figure 1 and Figure 2, the recesses are shown firstly partly with rectangular shape, secondly with a shape made up of a plurality of rectangles. These illustrated shapes are in no way limited with respect to the variety of different shapes which can be assigned to the said recesses.

The above configurations, as previously stated, can also be applied to a backrest part 3 belonging to the seat 1, which backrest part can also be contrived for ventilation by injection or extraction of air to or from at least two air-distributing recesses (not shown).

5

With reference to Figure 7, when the ventilation occurs by injection of air, it is possible, as previously stated, to contrive both the driver's seat and other vehicle seats such that they can be cooled with supplied air, which, in turn, is cooled by means of a special cooling device. This cooling device can be, for example, in the form of a so-called Peltier element 19. Such a cooling element 19 can be placed in connection with the respective seating part. In addition, the cooling element 19 is connected to a power supply unit 20. The air which is then fed to the seating part will in this case be cooled, which is advantageous from the comfort and safety respect. Any air-conditioning system present in the vehicle can also be used to supply cooled air. In certain cases, however, it can be more agreeable to have ventilation by air sucked from whomever is sitting in the seat, which air is conducted onward down through the seating part. In this case, no special cooling device is used.

20

In a vehicle context, there is additionally a desire for the respective seating part to have an accurately adjusted temperature on its surface, i.e. on the surface 21 which is felt by the passengers in the vehicle. To this end, when supplied air is injected, the temperature of the cooling element 19 is regulated by means of a temperature sensor 22, which in this case is disposed in the seating part 2 and is connected to a control unit 23. By means of the temperature sensor 22 and the control unit 23, the present temperature can be detected and, on the basis of detected temperature values, the control unit 23 can regulate the power supply unit 20 to feed current to the cooling element 19. For both the air-injection and air-extraction scenarios, detected temperature values can provide the foundation for starting or stopping the fan 12 which is used and for regulating the speed of the said fan. The same principle is also applicable should the seating part be

30

heated by means of a heating element 6 of the aforementioned type.

Configurations described in connection with Figure 7 can also be applied, in whole or in part, to a backrest part 3 belonging to the seating part.

5

The invention is not limited to the above, but rather different embodiments are possible within the scope of the claims. Expediently, the invention can be applied in connection with vehicle seats, but other types of seats can also enter into consideration.

## CLAIMS

1.     Seat construction (1) comprising a seating part (2) and a backrest part (3) and contrived for ventilation by injection of air to or extraction of air from  
5     at least two air-distributing recesses (4, 5) in the said seating part (2) or backrest part (3) arranged for the distribution of supplied or evacuated air to or from the surface of the said seating part (2) or backrest part (3), characterized in that at least one connecting duct (15), connecting the  
10     said air-distributing recesses (4, 5), passes at least one trench (10) present in the seat (1) for upholstery-fastening application in such a way that the said connecting duct (15) is led beneath the said trench (10) or through the said trench (10).
2.     Seat construction (1) according to claim 1, characterized in that  
15     it is constructed for both the seating part (2) and the backrest part (3).
3.     Seat construction (1) according to claim 1 or 2, characterized in that it comprises a fan (12) which is contrived to feed air to or from the said air-distributing recesses (4, 5) via the said connecting duct (15) and, in  
20     addition, at least one duct (13) connecting the said fan (12) to one of the said recesses (4, 5).
4.     Seat construction (1) according to claim 3, characterized in that it comprises a temperature sensor (22) connected to a computer-based  
25     control unit (23), the said fan (12) being contrived to be automatically activated in dependence on the detected temperature.
5.     Seat construction (1) according to any of the preceding claims, characterized in that it comprises a cooling device (14, 19) for cooling  
30     supplied air.
6.     Seat construction (1) according to any of claims 1-4, characterized in that the said air-distributing recesses (4, 5) are

connected to an external air-conditioning system for supplying cooled air via the said ducts (13, 15).

7.     Seat construction (1) according to any of the preceding claims,  
5     characterized in that the said fan (12) is a radial fan.

8.     Method for producing a seat construction (1) comprising a seating part  
(2) and a backrest part (3) and contrived for ventilation by injection of air to or  
extraction of air from at least two air-distributing recesses (4, 5) in the said  
seating part (2) or backrest part (3) arranged for the distribution of supplied  
10     or evacuated air to or from the surface of the said seating part (2) or backrest  
part (3), characterized in that the method comprises:

the introduction of at least one connecting duct (15) for connecting the  
air-distributing recesses (4, 5) in such a way that the said at least one  
connecting duct (15) passes at least one trench (10) present in the seat (1)  
15     for upholstery-fastening application in such a way that the said connecting  
duct (15) is led beneath the said trench (10) or through the said trench (10).

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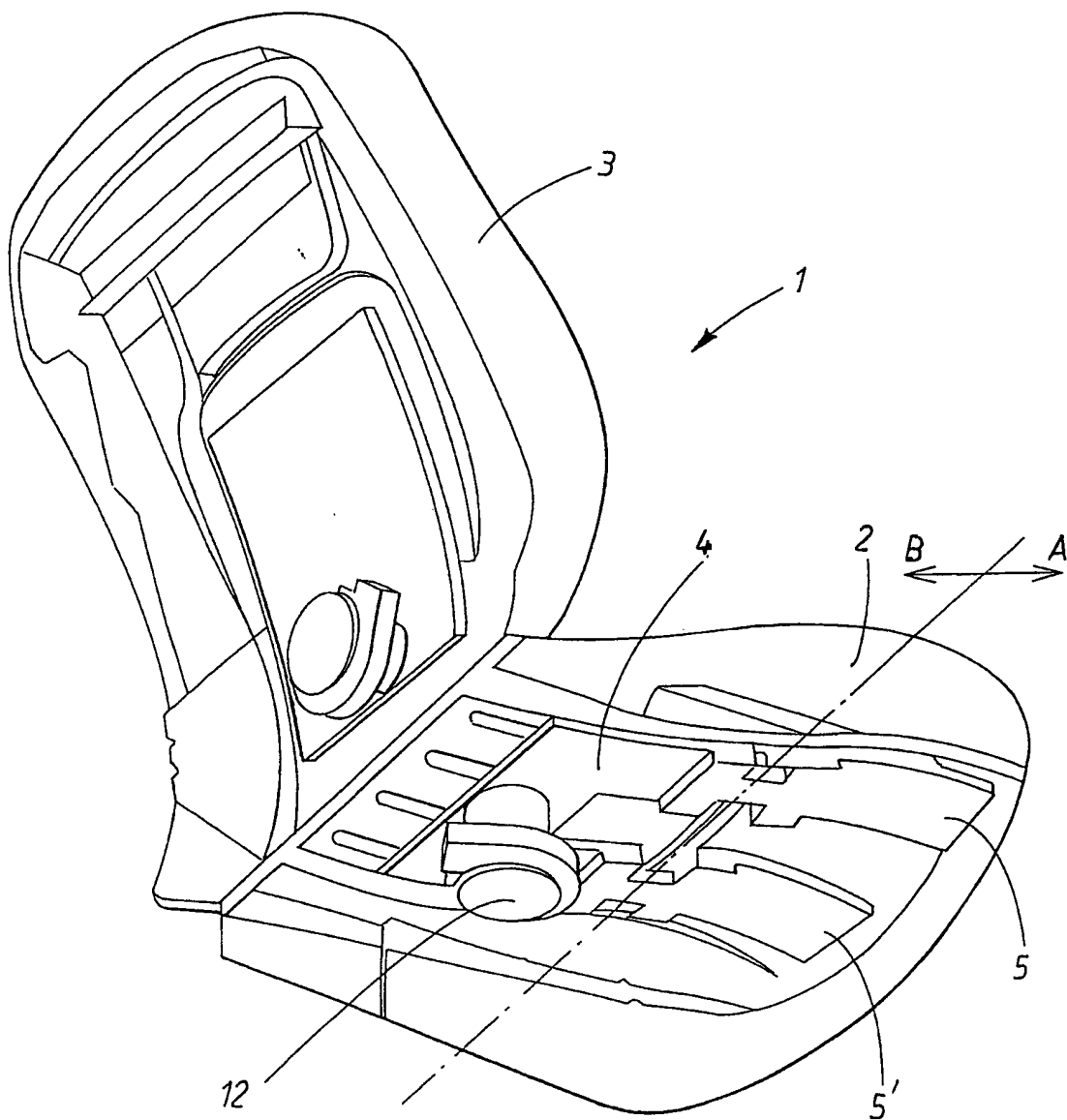


FIG. 1



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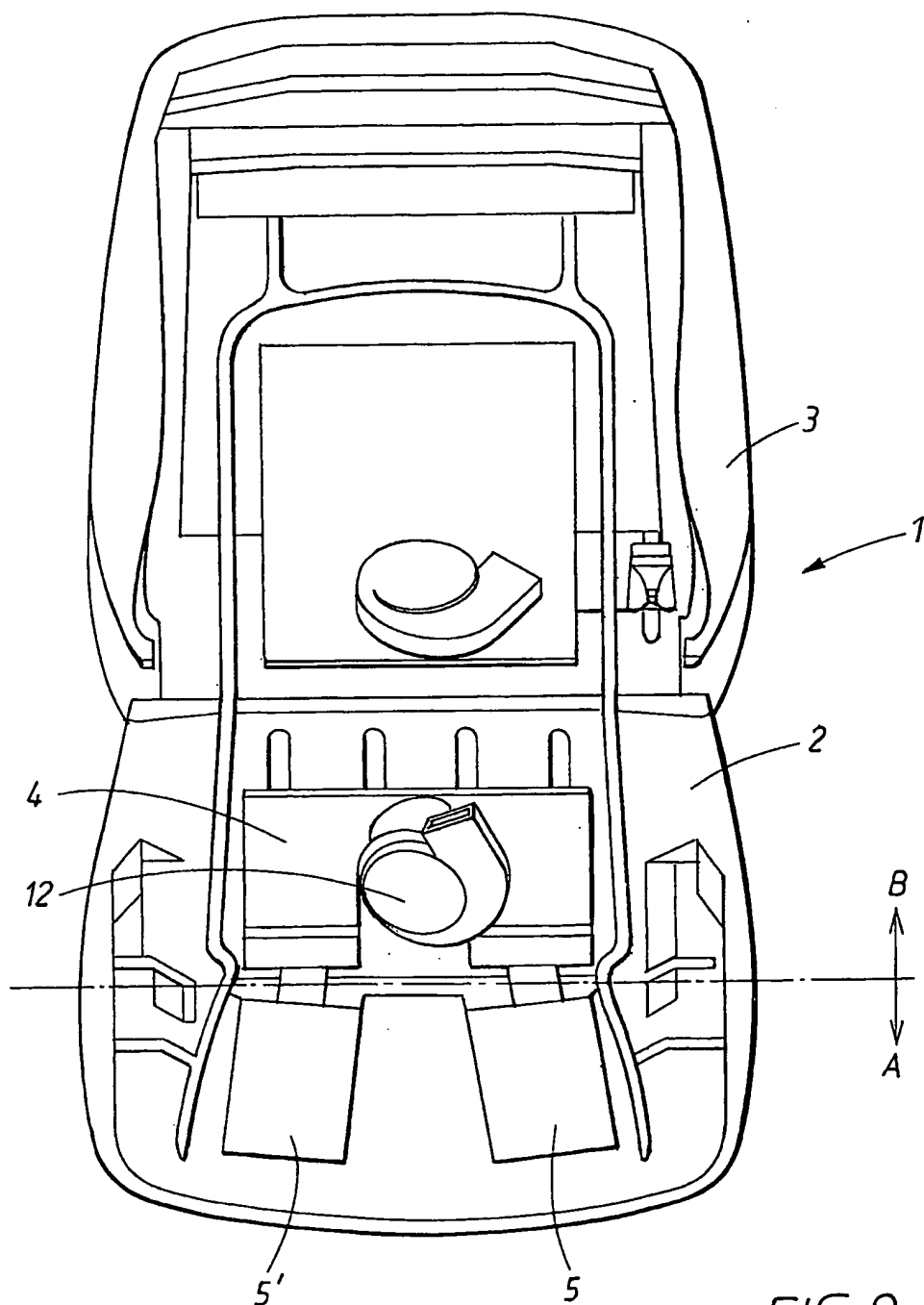


FIG. 2

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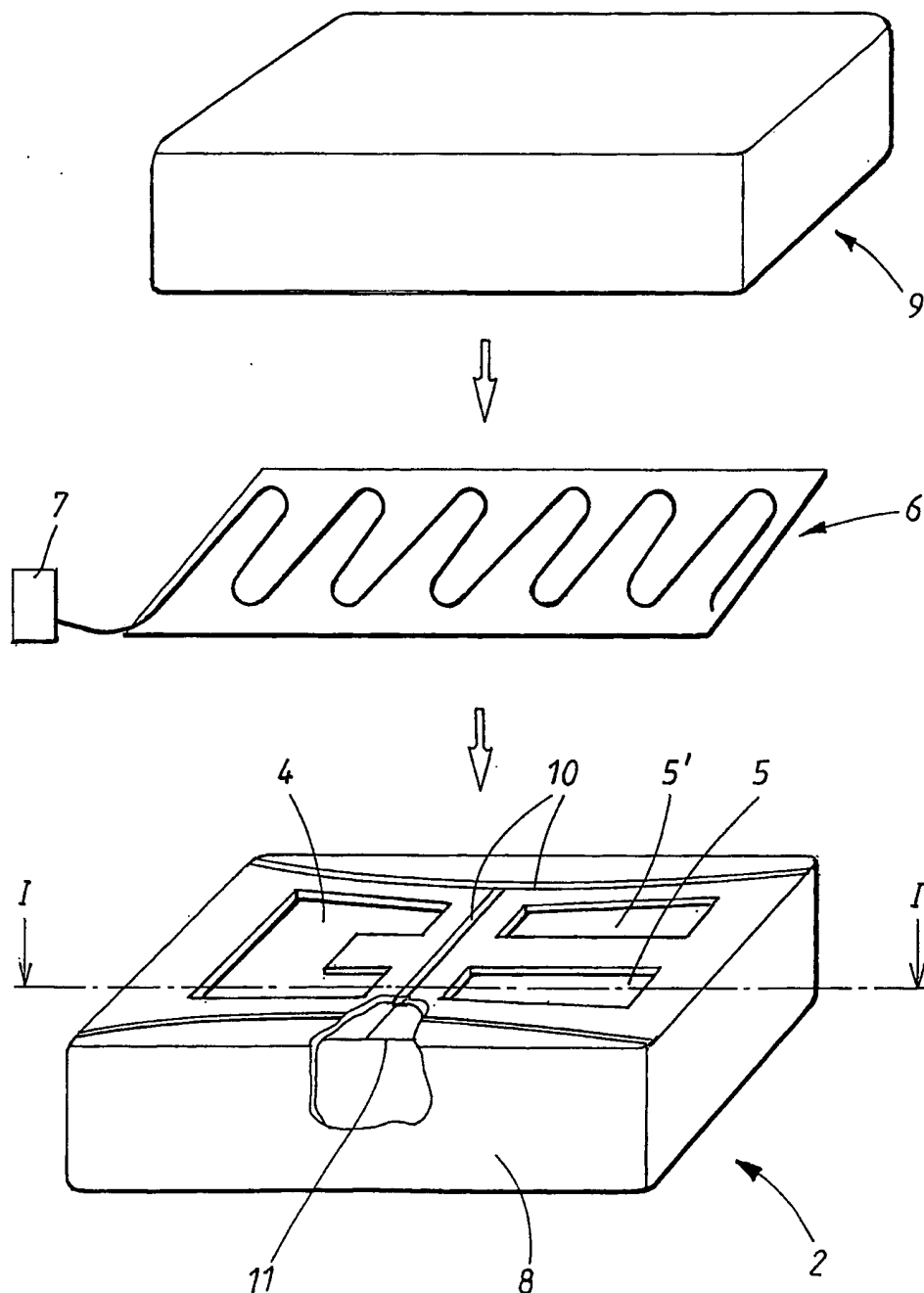
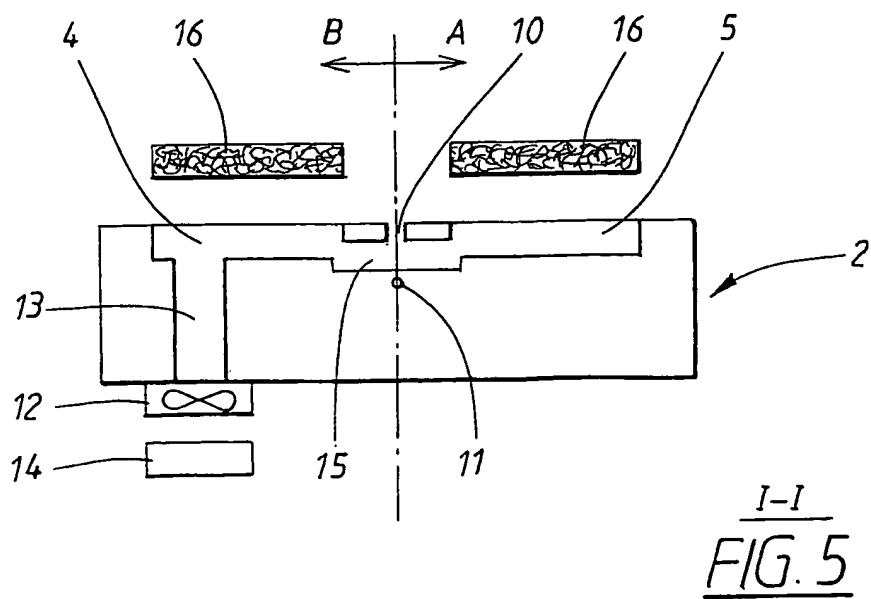
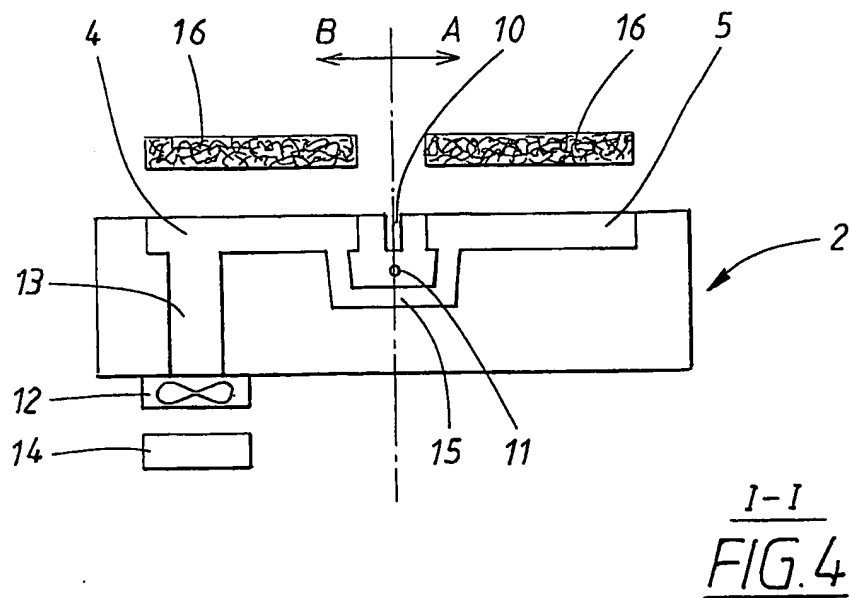
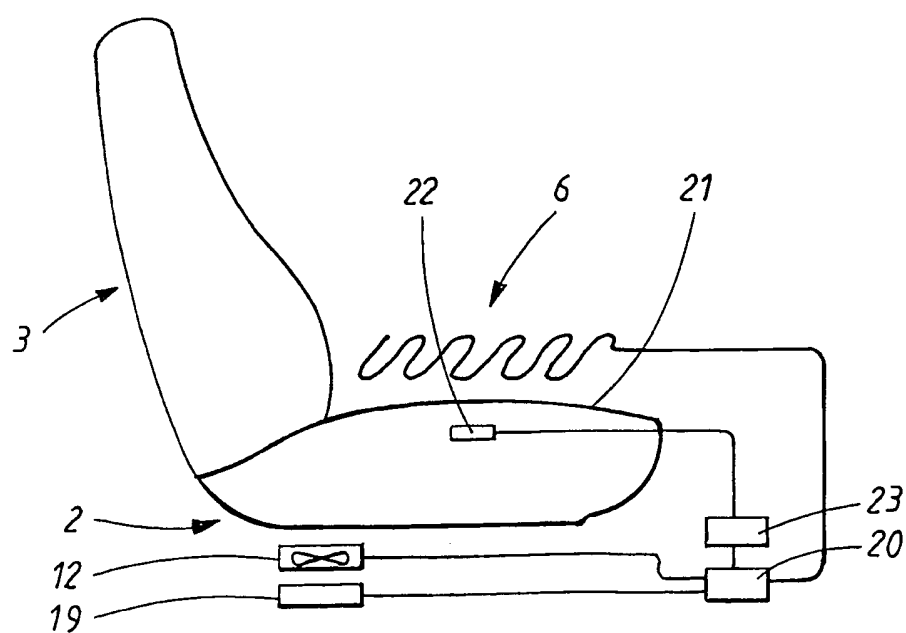
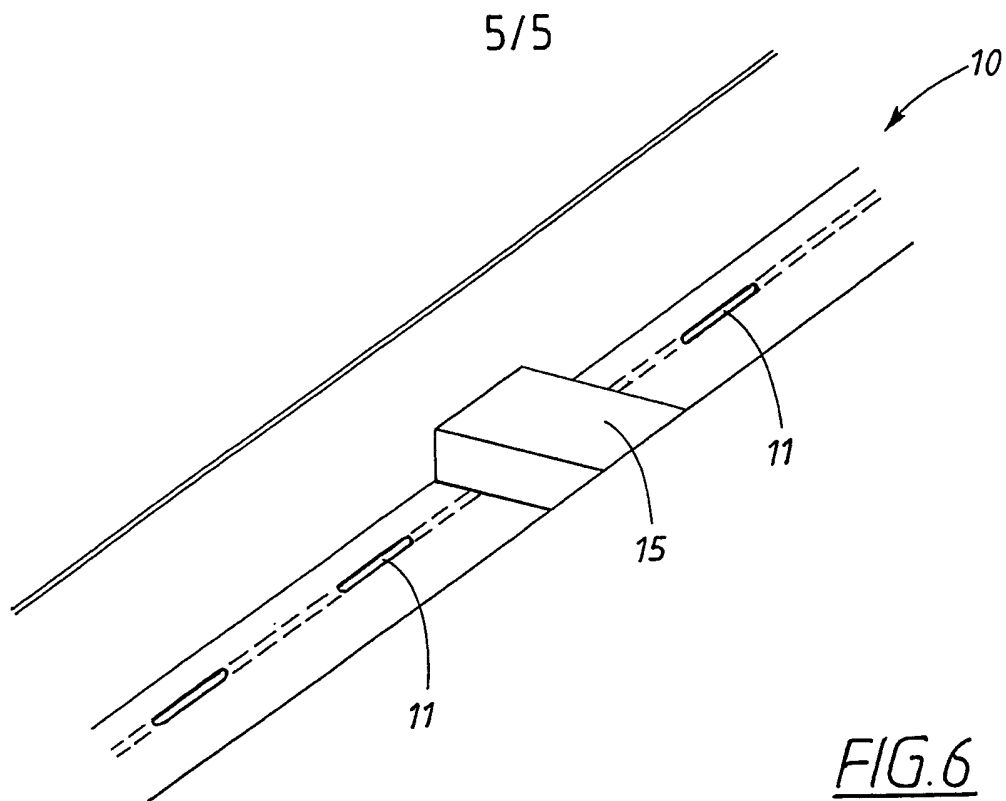


FIG. 3

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 03/00889

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B60N 2/56, A47C 7/74

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B60N, A47C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6179706 B1 (YOSHINORI ET AL.), 30 January 2001 (30.01.01), column 4, line 23 - line 36, figure 4	1-3,5-8
Y	--	4
X	WO 0211968 A2 (WOODBIDGE FOAM CORPORATION), 14 February 2002 (14.02.02), page 7, line 8 - page 8, line 2, figure 5, abstract	1-3,5-8
Y	--	4

☒ Further documents are listed in the continuation of Box C.
 ☒ See patent family annex.

## \* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
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Date of the actual completion of the international search

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 03/00889

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6206465 B1 (FAUST ET AL.), 27 March 2001 (27.03.01), column 2, line 35 - line 57, figure 2, abstract	1-3,5-7
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X	DE 10037065 A1 (DAIMLER CHRYSLER AG), 7 February 2002 (07.02.02), column 2, line 33 - column 3, line 25, figures 1,4	1-3,5-8
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Y	US 6105667 A (YOSHINORI ET AL.), 22 August 2000 (22.08.00), figure 1, abstract	4
A	DE 19845697 C1 (BERTRAND FAURE SITZTECHNIK GMBH & CO. KG), 30 March 2000 (30.03.00)	1,3
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**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

26/07/03

International application No.  
PCT/SE 03/00889

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